

Research Article

Carbon Storage and Environmental Adaptation of *Eucalyptus camaldulensis* Dehnn, in Bangladesh

Mohammed Mukhlesur Rahman¹, Md. Redwanur Rahman^{1,*} , Sabrina Naz²

¹Institute of Environmental Science, University of Rajshahi, Rajshahi, Bangladesh

²Department of Botany, University of Rajshahi, Rajshahi, Bangladesh

Abstract

Eucalyptus camaldulensis Dehnn is an exotic forest tree species, and established orchards are found all over Bangladesh. *E. camaldulensis* is a fast-growing timber species that helps to fulfill the demand for fuel wood. The abstract summarizes a study on the carbon sequestration potential of *Eucalyptus camaldulensis* (commonly known as the River Red Gum) compared to other indigenous tree species in Bangladesh. The study focuses on assessing the carbon storage capacity of this species at different stages of growth using allometric equations. The findings of the study revealed that diameter at breast height and height were 14.93, 17.36, 20.61, 23.03, 26.21, 29.65, 9.46 cm, and 10.72, 11.34, 12.01, 14.62, 17.44 m at 5, 8, 10, 12, 15, and 20 years old plantation respectively. The study indicated that mean annual diameter increments, and mean annual height increments were 2.99, 2.17, 2.06, 1.92, 1.76, 1.48 cm and 1.89, 1.34, 1.13, 1.00, 0.96, and 0.87 m respectively. The present study showed that the aboveground carbon, belowground carbon and the total carbon were stored 38.50, 57.79, 84.53, 129.75, 209.18, 362.19 kg tree⁻¹ and 7.70, 11.56, 16.91, 25.95, 41.84, 27.44 kg tree⁻¹ and 46.20, 69.35, 101.44, 155.70, 251.01, 434.63 kg tree⁻¹ respectively at 5, 8, 10, 12, 15 and 20 years old respectively. On an average carbon values were 5.03, 5.41, 5.89, 8.71, 13.05 and 17.24 kg tree⁻¹year⁻¹ respectively. The present study indicated that the total capturing carbon dioxide values were 18.46, 19.85, 21.62, 31.95, 47.89 and 63.26 kg tree⁻¹ year⁻¹ at 5, 8, 10, 12, 15 and 20 years old respectively. Statistical analysis revealed that diameter, height, and biomass were varied significantly in different ages ($p < 0.05$). The present study revealed that there is a positive correlation ($r = 0.991836$) between surviving and current temperature, but negative correlation was found between surviving and current rainfall. ($r = -0.71422$). *Eucalyptus camaldulensis* can harm soil fertility due to its allelopathic effects, high nutrient demands, and water consumption where it is an introduced plant species. While it can benefit carbon sequestration and other ecological roles, its widespread use in non-native areas should be cautiously approached. Proper management practices, such as periodic soil amendments or companion planting with species that improve soil fertility, may help mitigate the negative effects on soil health.

Keywords

Allometric Equations, Biomass, Global Warming, Mitigation, Organic Carbon, Rainfall, Temperature

*Corresponding author: redwan_rahman@ru.ac.bd (Md. Redwanur Rahman)

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1. Introduction

Eucalyptus camaldulensis Dehnh. belongs to the family Myrtaceae and it is the most important indigenous forest tree species in different provenances of Australia. It has adapted in many arid, semi-arid tropical regions of the world such as tropical regions of Africa since 1900 [1]. In Bangladesh, *Eucalyptus* was introduced in the 19th century as a shade plant to decorate parks, roadsides, and botanical gardens in different institutes. At first *Eucalyptus citriodora* was introduced in the eastern parts of Bangladesh by the tea planters as an ornamental tree [2]. Subsequently, it is spread throughout the country as mass plantations by botanists, foresters, gardeners and tree planters [3]. Adaptation trials were accomplished in different regions of Bangladesh for ensuring of adaptability. In this case, the first trials of *Eucalyptus* were initiated by Bangladesh Forest Research Institute (BFRI) in 1965.

In Bangladesh, 84 seed lots of 12 species of *Eucalyptus* were imported from different parts of Australia through CSIRO (Commonwealth Scientific and Industrial Research Organization). *Eucalyptus camaldulensis*, *E. tereticornis* and *E. brassiana* were found as suitable in the climatic and edaphic conditions of Bangladesh through elimination trials [2, 4]. However, the result of *E. urophylla* provenances trial in Tangail and Dinajpur claims the superiority of another *Eucalyptus* in Bangladesh [5]. Another study on the coppicing ability of different provenances of *E. camaldulensis*, *E. tereticornis* and *E. brassiana* showed that their coppicing ability was very high and *E. camaldulensis* produced the highest coppice yield [6]. In Bangladesh, *Eucalyptus camaldulensis* was planted by the Forest Department and it had been also planted by private sectors due to fast-growing quality. It is recorded that about 12000 hectares *Eucalyptus* plantations have been raised in the forest lands. Besides, scattered plantations have been established in the farm lands, home gardens, strip plantations and ornamentation plantings throughout the country [7]. Among them, *E. camaldulensis* is the most popular tree species in the whole country of Bangladesh.

Now the Government of Bangladesh is reluctant to planting *Eucalyptus* due to the environmental issues. But there are many established orchards throughout the country of Bangladesh. But sufficient research has not been done on carbon storage and environmental adaptation of *Eucalyptus camaldulensis*. For this reason, the present study has been taken an attempt to determine carbon storage and adaptation ability of *E. camaldulensis* which will be helpful to compare with indigenous forest trees species of Bangladesh.

2. Materials and Methods

2.1. Description of the Study Area

The study was conducted on homestead forest areas at Natore sadar upzila under Natore district in Bangladesh.

Geographically, the study area is situated between 24° 07' to 24° 43' North latitudes and 88° 17' to 88° 58' East longitudes (Figure 1). This area is fall under the tropical region and it is also known as the hottest district of Bangladesh. The climatic condition is hot-humid summer with moderate rainfall and mild winter with foggy some times. The summer season is considered from April to last June.

2.2. Climatic Condition

The rainy season starts at the end of June and stays up to September. The winter season comes from the middle November and lasts up to the end of February. Temperature variation appears that average annual temperature is about 26-36°C. The minimum and maximum mean temperature during winter varies from 9 to 14°C. The minimum and maximum mean temperature varies 25.500 to 40.700°C during summer season. The soil of the study area is rich in alluvium and clay texture with pH 7.22 in average. This soil is the perfect for agricultural and horticultural crops (BBS, 2023).

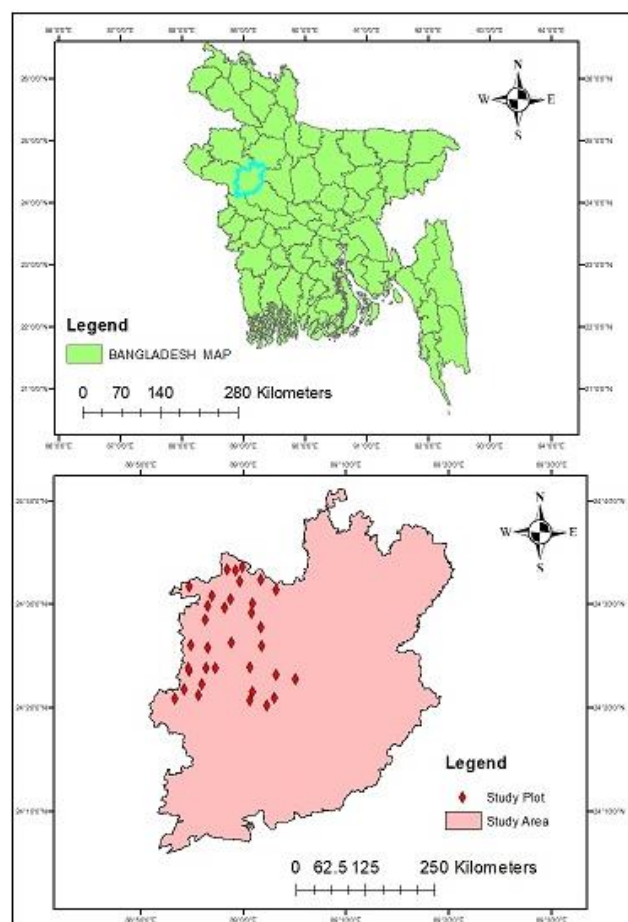


Figure 1. Location of the study area.

2.3. Vegetation

The study area was covered by various planted timber tree species. The following planted species were dominant such as *Mangifera indica*, *Azadirachta indica*, *Swietenia macrophylla*, *Albizia richardiana*, *Eucalyptus camaldulensis*, *Acacia auriculiformis*, *Samanea saman*, *Artocarpus heterophyllus*, *Delonix regia*, *Caesalpinia pulcherrima* and *Citrus maxima* etc. Homestead forest is accelerating as a geometrical rate due to fulfill the demand of fuel wood and timber. Massive plantation has been started in the study area with the help of some selected forest tree species. Before plantation, the area was included of cultivation land and different types of agronomical and horticultural crops were grown such as *Oryza sativa*, *Corchorus capsularis*, *Saccharum officinarum*, *Litchi chinensis*, *Manilkara zapota*, *Ziziphus mauritiana*, *Averrhoa carambola*, *Psidium guajava* and *Musa sapientum*, etc.

2.4. Selection of Plots

The study was conducted on monoplanted area of *Eucalyptus camaldulensis*. Systematic sampling method was used for selection plots with the help of tape and coordinates were recorded using Global Positioning Systems which is recognized by several scientists [8]. Each plot was 100 meters apart from each other. Each plot was circular and covered 10 meters (radius). The total numbers of plots were 832 (eight hundred thirty two). The total study area was only about 108 hectares and sampling area was 1 (one) hectare. The sampling area should be at least 1% [9], but more than 7.96 % were taken in the present study period. After laying out of the plots, the number of trees in each plot were counted, identified and recorded. A diameter tape was used to measure the DBH (1.30 m above from the ground level) of all the trees in each plot. Diameter at breast height (DBH) and total height (H) were measured of trees in the whole plots of the study area. Height of the trees having DBH equal or greater than 5 cm was measured with a Hega- altimeter. Trees on the border was included in a plot if > 50 % of their basal area fell within the plots and excluded if < 50 % of their basal area fell outside the plot. Trees overhanging to the plots were excluded, but with their trunk inside of the sampling plots, and branches out were included. Care was taken to ensure that the diameter tape is put around the stem exactly at the point of measurement.

2.5. Estimation of Trees Biomass

There are two types of methods for the determination of biomass and carbon of forest tree species in the world. When cutting down all trees in a particular area and determining biomass and carbon is called the destructive method. There is a non-destructive method, which is completed based on diameter at breast height and total height of an individual tree. Non-destructive method is more rapid, large area and number of trees can be sampled without sampling error [10]. This method is considered as the most suitable method for deter-

mination of biomass and carbon in the tropical region of forests [11-15]. This method is also called Brown's model.

Biomass and carbon were determined using the above model and detail description is given below.

$$AGB = \exp. \{-2.4090 + 0.9522 \ln(D^2HS)\}$$

Where,

AGB is the aboveground biomass (kg),

H is the height of the trees (m),

D is the diameter at breast height (cm),

S is the wood density (kg /m³) for specific species.

Wood density values of the species of the present study were obtained from [16]

Aboveground biomass per plot and per hectare was calculated by the following formulas:

AGB per plot = Summation of the AGB values of all the trees in a plot.

AGB per track = Summation of AGB values of all the plots.

$$AGB \text{ per hectare} = \frac{\text{Sum of AGB values of all the plots}}{\text{Total area of all the plots}} \times 10,000$$

Belowground is an essential part of a tree and it is calculated based on aboveground biomass. In this case, belowground biomass is considered 20% of aboveground biomass [17]. The formula is given below:

$$BGB = AGB \times (20/100)$$

The aboveground and belowground biomass (BGB) was added to get the total biomass of a tree. Total biomass (TB) per plot, and per hectare were calculated by the following formulas:

TB per plot = Summation of the total biomass values of all the trees in a plot

$$TB \text{ per hectare} = \frac{\text{Sum of total biomass values of all the plots}}{\text{Total area of all the plots}} \times 10,000$$

2.6. Data Analysis

Descriptive statistics were calculated to describe biomass and carbon in trees. Analysis of variance (ANOVA) was done at different age aspects. Duncan's multiple range tests were used to determine the significance of the variation in the mean. Statistical Package for Social Science (SPSS) version 21 was used to perform these analyses.

3. Results and Discussion

3.1. Determination of Diameter at Breast Height and the Total Height of *Eucalyptus camaldulensis* in Different Ages

Diameter at breast height and the total height are the most

important parameters for the determination of biomass and carbon of standing trees in a forest. Normally, diameter and height are independent parameters in the determination of biomass of trees. The biomass and carbon were measured based on diameter at breast height and the total height using Allometric equations. The present study was measured diameter at breast height and the total height of *E. camaldulensis* in the selected orchards. The findings of the study indicated that the average values of diameter at breast height (cm) and height (m) were 14.93, 17.36, 20.61, 23.03, 26.21, 29.65 cm and 9.46, 10.72, 11.34, 12.01, 14.62, and 17.44 m at 5, 8, 10, 12, 15, and 20 years old plantation respectively (Table 1).

Table 1. Diameter at breast height and height of *E. camaldulensis* at different ages.

<i>E. camaldulensis</i>		
Years	DBH (cm)	H (m)
5	14.93±0.72	9.46±0.25
8	17.36±0.64	10.72±0.34
10	20.61±0.44	11.34±0.30
12	23.08±0.89	12.01±0.39
15	26.21±0.49	14.62±0.33
20	29.65±0.21	17.44±0.42

DBH=Diameter at breast height, H= Height

The growth of diameter at breast height and the total height were sufficient, but tree density was so much lower than other forests. Maximum plantations were in the barren land and edge side of the cultivated areas. The main aims of the plantation of the study areas were to harvest timber and fulfill fuel wood demand at the local people.

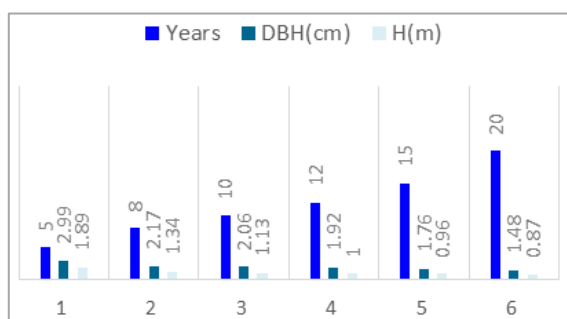


Figure 2. MADI and MAHI of *E. camaldulensis* in different ages.

The biomass and carbon are depended on mean annual diameter increment (MAI) and mean annual height increment

(MAHI). The study measured that mean annual diameter increments were 2.99, 2.17, 2.06, 1.92, 1.76, and 1.48 cm found in *E. camaldulensis*. The mean annual height increments were 1.89, 1.34, 1.13, 1.00, 0.96, and 0.87 m found in *E. camaldulensis* respectively (Figure 2). Diameter and heights are increased with increasing of ages but the ratio is higher in the initial stage.

Mean annual diameter increment and mean annual height increment of *E. camaldulensis* are depended on rotation, management, environment, and edaphic criteria. Irrigation can lead to increase yield such as *E. camaldulensis* provides mean annual increment 20 m³ha⁻¹ at 3 years old plantation without irrigation and 50 m³ha⁻¹ under irrigation in the same ages [18]. The yield rate of *E. camaldulensis* is 5-10 m³ha⁻¹year⁻¹ at 10-20 years rotations in the drier tropical regions. It is reported that yield is 30 m³ha⁻¹year⁻¹ at 7-20 year rotations in the moist regions [19]. The mean annual increment is about 12m³ha⁻¹ at 20 years old plantation in the tropical regions of Laos [20]. The overall yield of the species is about 12 m³ha⁻¹year⁻¹ at four years old plantation in Southern Vietnam. It is also observed that better adapted sites give yields of 20 m³ha⁻¹year⁻¹ at four years old plantation in Southern Vietnam. A fourfold growth rate is found in Brazil through tree breeding and better plantation management programs [21]. In Bangladesh, the expected yield of Eucalyptus plantation was 9.20 m³ha⁻¹year⁻¹ [3].

3.2. Determination of Basal Area of *E. camaldulensis*

The study was conducted on artificial plantation area of *E. camaldulensis* and basal area was determined and indicated that the average value of basal area of each tree was 0.01, 0.02, 0.03, 0.04 and 0.05 and 0.07 m²tree⁻¹ at 5, 8, 10, 12, 15 and 20 years old trees respectively (Figure 3).

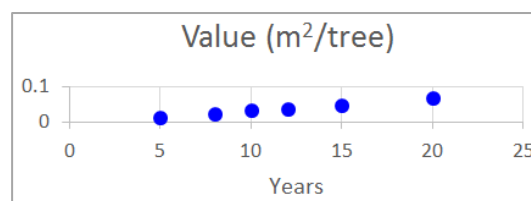


Figure 3. Increment of basal area in different years.

3.3. Relationship Between Diameter, and Total Height of *E. camaldulensis*

The biomass was determined based on diameter at breast height and the total height. The present study indicated that a positive correlation between diameter and total height of trees ($r = 0.964927$). Statistical analysis revealed that diameter and height were varied significantly in different ages ($p < 0.05$).

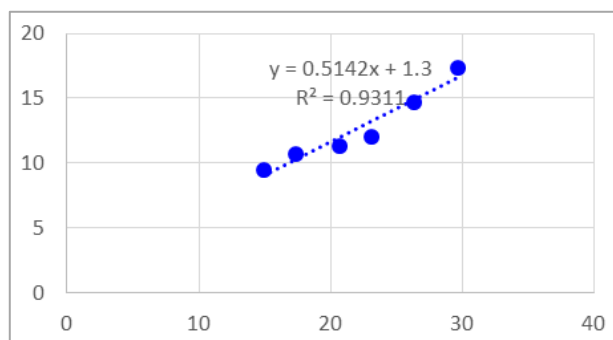


Figure 4. Regression between diameter and height of *E. camaldulensis*.

Figure 4 indicates that the diameter at breast height is increasing 0.5142, which reveals that there is a positive linear relationship between diameter and height. The R^2 value is about of 0.9311 means only 93% of height is explained by diameter.

3.4. Relationship Between Diameter and Biomass of *E. camaldulensis*

Diameter at breast height is the most important parameter for the determination of biomass and carbon of tree species. The present study revealed that there is a positive correlation between diameter and biomass. In this case, correlation (r) value is 0.94429 between diameter and biomass. Statistical analysis revealed that diameter, and biomass were varied significantly in different ages ($p < 0.05$)

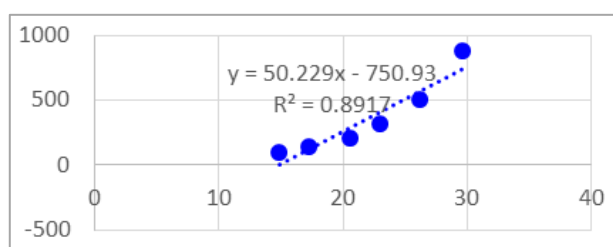


Figure 5. Regression between diameter and biomass of *E. camaldulensis*.

Figure 5 indicates that the diameter at breast height is increasing 50.229, which reveals that there is a positive linear relationship between diameter and biomass. The R^2 value is about of 0.8917 means only 89% of biomass is explained by diameter.

3.5. Relationship Between Height, and Biomass of *E. camaldulensis*

Actually height is an essential component of tree species, when biomass is determined using Allometric equations. Height plays a vital role in determination of biomass. The present study revealed that there is a positive correlation between height and biomass. In this case, correlation (r) value is 0.990327 between height and biomass. Statistical analysis revealed that height, and biomass was varied significantly in different ages ($p < 0.05$).

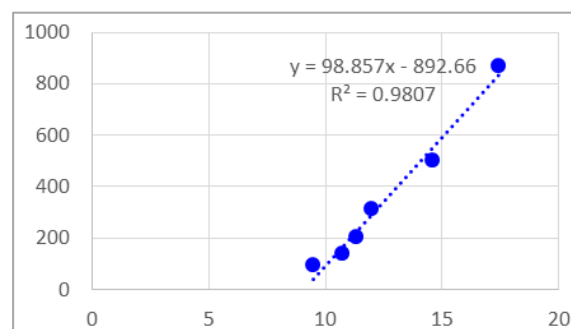


Figure 6. Regression between height and biomass of *E. camaldulensis*.

Figure 6 indicates that the height is increasing 98.857, which reveals that there is a positive linear relationship between height and biomass. The R^2 value is about of 0.9807 means only 98% of biomass is explained by height.

3.6. Determination of Biomass of *E. camaldulensis*

The main objective of the study was to determine biomass and carbon based on diameter at breast height and the total height of *E. camaldulensis*. The total biomass of *E. camaldulensis* of different ages is presented in the following Table (Table 2). The results revealed that the aboveground biomass, belowground biomass and total biomass were 76.99, 115.58, 169.07, 259.51, 418.36, 724.38 kg tree⁻¹, and 15.40, 23.12, 22.81, 51.90, 83.67, 144.88 kg tree⁻¹ and 92.39, 138.70, 202.88, 311.41, 502.03, and 868.26 kg tree⁻¹ at 5, 8, 10, 12, 15 and 20 years old respectively. The highest value was 869.26 kg tree⁻¹ year⁻¹ found in *E. camaldulensis* at 20 years old. The lowest value was 92.39 kg tree⁻¹ found at 5 years old. On an average biomass values were 18.48, 17.34, 20.29, 25.95, 33.47 and 343.46 kg tree⁻¹ year⁻¹ respectively (Table 2).

Table 2. Aboveground biomass, belowground biomass, and total biomass of *E. camaldulensis* in different ages.

Name of sp.	Years	AGB per tree (kg)	BGB per tree (kg)	TB per tree (kg)	Kg tree ⁻¹ year ⁻¹
<i>E. camaldulensis</i>	5	76.99±0.62	15.40±0.11	92.39	18.48
	8	115.58±2.11	23.12±0.21	138.70	17.34
	10	169.07±3.21	33.81±0.43	202.88	20.29
	12	259.51±2.94	51.90±0.22	311.41	25.95
	15	418.36±3.56	83.67±1.19	502.03	33.47
	20	724.38±2.99	144.88±1.44	869.26	43.46

AGB=Aboveground biomass, BGB=Belowground biomass and TB=Total biomass

Several scientists reported that the biomass values were 61.75, 51.37, 37.08, 27.26 and 13.21 kg/tree found in *Acacia auriculiformis* at 11, 10, 9, 8, and 7 years old plantation of Bangladesh [22]. Another study was conducted on biomass of *Casuarina equisetifolia* under Inani and Teknaf Ranges of Chittagong Coastal Division and reported that 0.16, 0.31, 0.40, and 0.47t/tree at 5, 10, 15, and 20 years old plantation [23]. A study was conducted on *Mangifera indica* at Rajshahi University campus area and observed that the biomass values were 463.40 kg /tree at 20 years old plantation [24]. A study was also conducted on *Mangifera indica*, and *Psidium guajava* and reported that the biomass values were 173. 51 and 88.19 kg/tree at 10-20 years old [25]. It is clear from the above discussion that biomass values depend on species to species, genotypic criteria, environmental factors and management.

3.7. Determination of Carbon of *E. camaldulensis*

The main goal of the study was the determination of carbon storage capacity of *E. camaldulensis* in different ages of planted orchard. The present study was indicated that the aboveground carbon, belowground carbon and the total carbon of *E. camaldulensis* were stored 38.50, 57.79, 84.53, 129.75, 209.18, 362.19 kg tree⁻¹ and 7.70, 11.56, 16.91, 25.95, 41.84, 27.44 kg tree⁻¹ and 46.20, 69.35, 101.44, 155.70, 251.01, 434.63 kg tree⁻¹ respectively at 5, 8, 10, 12, 15 and 20 years old respectively (Table 3). The highest value was 434.63 kg tree⁻¹year⁻¹ found in *E. camaldulensis* at 20 years old. The lowest value was 5.03 found at 5 years old. On an average carbon values were 5.03, 5.41, 5.89, 8.71, 13.05 and 17.24 kg tree-1year-1 respectively (Table 3).

Table 3. Aboveground carbon, belowground carbon and total carbon of *E. camaldulensis* in different ages.

Name of sp.	Years	AGC per tree (kg)	BGC per tree (kg)	TC per tree (kg)	tree ⁻¹ year ⁻¹ (kg)
<i>E. camaldulensis</i>	5	38.50	7.70	46.20	9.24
	8	57.79	11.56	69.35	8.67
	10	84.53	16.91	101.44	10.14
	12	129.75	25.95	155.70	12.98
	15	209.18	41.84	251.01	16.73
	20	362.19	72.44	434.63	21.73

AGB=Aboveground biomass, BGB= Belowground biomass, TB= Total biomass, AGC=Aboveground carbon, BGB=Belowground carbon and TC= Total carbon

The main objective of the study was to determine the total carbon based on tree-1year-1. Actually, carbon storage capacity depends on edaphic and biotic factors. It is also clear

that carbon storage capacity is varied from species to species such as 30.87, 25.68, 18.54, 13.63, and 6.61 kg/tree were recorded in *Acacia auriculiformis* at 11, 10, 9, 8 and 7 years

old plantation [22]. Another study was conducted on carbon storage of *Casuarina equisetifolia* and observed that 0.08, 0.15, 0.20, and 0.24t/tree at 5, 10, 15, and 20 years old plantation [23]. A study was conducted on *Mangifera indica* at Rajshahi University campus area and observed that the biomass values were 231.50 kg /tree at 20 years old plantation [24]. A study was also conducted on *Mangifera indica*, and *Psidium guajava* and reported that the biomass values were 86.76 and 44.10kg/tree at 10-20 years old [25]. From the above discussion, it is indicated that the biomass and carbon storage are influenced by age, diameter, height, and wood density etc.

3.8. Determination of Carbon Sequestration Capacity of *E. camaldulensis*

Carbon dioxide is captured by plants through photosynthesis process and carbon is stored in the body as biomass. The stored biomass is used in different physiological activities of trees. The present study indicated that the total capturing carbon dioxide values were 18.46, 19.85, 21.62, 31.95, 47.89 and 63.26 kg tree⁻¹year⁻¹ at 5, 8, 10, 12, 15 and 20 years old respectively (Table 4). The highest value was 63.26 kg tree⁻¹year⁻¹ found in *E. camaldulensis* at 20 years old. The lowest value was 18.46 kg tree⁻¹year⁻¹ found at 5 years old (Table 4).

Table 4. Carbon storage, capturing CO₂ and releasing O₂ tree⁻¹year⁻¹ of *E. camaldulensis* in different ages.

Name of sp.	Yrs.	Carbon storage tree ⁻¹ year ⁻¹ (kg)	Capturing CO ₂ tree ⁻¹ year ⁻¹ (kg)	Releasing O ₂ tree ⁻¹ year ⁻¹ (kg)
<i>E. camaldulensis</i>	5	5.03	18.46	13.29
	8	5.41	19.85	14.30
	10	5.89	21.62	15.56
	12	8.71	31.95	23.02
	15	13.05	47.89	34.48
	20	17.24	63.26	45.55

The study was also indicated that the total releasing oxygen values were 13.29, 14.30, 15.56, 23.02, 34.48 and 45.55 kg tree⁻¹year⁻¹ at 5, 8, 10, 12, 15 and 20 years old respectively (Table 4). The highest value was 45.55 kg tree⁻¹year⁻¹ found in *E. camaldulensis* at 20 years old. The lowest value was 13.29 kg tree⁻¹year⁻¹ found at 5 years old (Table 4).

Temperature is the most important climatic parameter which plays a vital role for surviving of all kinds of living organisms in the earth. In this case, the requirements mean, maximum, and minimum temperatures are 24.00, 26.00, and 17.50 °C respectively for surviving of *E. camaldulensis* [26]. But the following trends of temperature are observed in the atmosphere which is varied surviving. The present study revealed that there is a positive correlation between observing temperature of the earth and surviving temperature of *E. camaldulensis*. In this case, correlation (r) value is 0.991836 between height and biomass. Statistical analysis revealed that observed temperature and surviving temperature of *E. camaldulensis* were varied significantly ($p < 0.05$).

Figure 7 indicates that the observing temperature is increasing 0.3533, which reveals that there is a positive linear relationship between observing and surviving temperature. The R² value is 0.9837 means only 98% of observing temperature is explained by surviving temperature. The current rainfall patterns are suitable for surviving of *E. camaldulensis*.

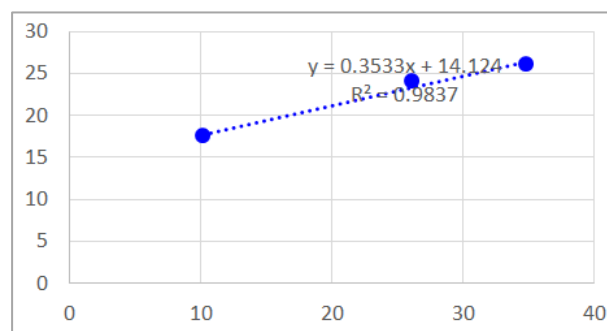


Figure 7. Regression between observing and surviving temperature.

Mainly, plants are depended on rainfall for the surviving in the earth. All kinds of biological activities are maintained with help of water. The rainfall is the chief source of plant's water in a forest area. Each tree species has a special type of water demand. This demand is varied species to species and there is specific correlation between rainfall and tree species. In this case, correlation (r) value is negative (-0.71422) between observing and surviving rainfall. Statistical analysis revealed that observed rainfall and surviving rainfall of *E. camaldulensis* were varied significantly ($p < 0.05$).

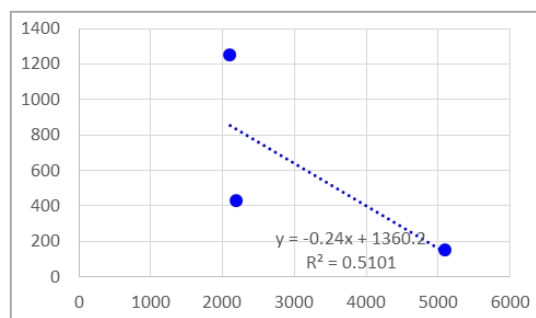


Figure 8. Regression between observing and surviving rainfall of *E. camaldulensis*.

Figure 8 indicates that the observing rainfall is decreasing (-0.24) which reveals that there is a negative linear relationship between observing and the surviving temperature. The R^2 value is about 0.5101 means only 51% of observing rainfall is explained by the surviving rainfall. The finding indicates that the annual rainfall patterns are disfavoured for the surviving of *E. camaldulensis*.

4. Conclusions

E. camaldulensis is the most popular planted tree in Bangladesh since mid of nineteen century. Mainly it is suggested to plant at the edge of agricultural crops field due to less foliage. Many orchards are established by the government of Bangladesh, non-government entrepreneurs, planters and private sectors in Bangladesh. Its plantation is increasing day by day at a geometrical rate due to fulfill fuel wood demand. The study reveals that the biomass and carbon storage capacity is also vicinity or less than other indigenous forest tree species. But unfortunately, the present findings indicate that *E. camaldulensis* is less suitable with the average rainfall patterns which are the main problem for surviving. The findings further suggest that *Eucalyptus camaldulensis* can be a promising species for carbon sequestration, and the study emphasizes that plantations should be carefully managed to ensure sustainable environmental development. The authors advise caution in the widespread planting of this non-native species, potentially due to its implications for local biodiversity and environmental balance.

Besides, leaves contain chemical substances that directly affect soil fertility and, finally, the organisms in the environment. Planters aware of the negative impacts are expected to be unwilling to plant *E. camaldulensis* for sustainable environmental development, and the government-recommended other indigenous species should be included in the massive plantation programs.

Abbreviations

DBH	Diameter at Breast Height
H	Height
MADI	Mean Annual Diameter At Breast Height

Increment

MAHI	Mean Annual Height Increment
AGB	Aboveground Biomass
BGB	Belowground Biomass
TB	Total Biomass
AGC	Aboveground Carbon
BGC	Belowground Carbon
TC	Total Carbon

Conflicts of Interest

The authors declare that no conflicts of interest.

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